## **Claims**

We claim:

5

10

20

1. A method of processing a traffic flow in a communication network comprising a plurality of nodes, the method comprising the steps of:

splitting the traffic flow into a plurality of parts; and

distributing the parts to respective ones of the plurality of nodes that are designated as participating in a load balancing process for the traffic flow;

wherein each of at least a subset of the participating nodes receiving one of the parts routes at least a portion of its received part to one or more destination nodes of the plurality of nodes.

- 2. The method of claim 1 wherein the traffic flow comprises an incoming packet flow arriving at a given one of the nodes.
- 3. The method of claim 1 wherein the traffic flow is split into the plurality of parts in a manner independent of the one or more destination nodes.
  - 4. The method of claim 1 wherein the traffic flow is split into a plurality of substantially equal parts.

5. The method of claim 1 wherein the traffic flow is split into a plurality of parts at least two of which comprise non-equal parts.

- 6. The method of claim 1 wherein traffic flow comprises virtually-concatenated data traffic.
  - 7. The method of claim 1 wherein the traffic flow is split into N parts at a given one of the nodes by maintaining N queues at the given node, and filling the queues from the traffic flow in accordance with a specified queue-filling technique.

25

- 8. The method of claim 7 wherein the specified queue-filling technique comprises one of a round-robin technique and a shortest queue first technique.
- 9. The method of claim 1 wherein the traffic flow is split into the plurality of parts utilizing a virtual concatenation technique.
  - 10. The method of claim 1 wherein the traffic flow is split into the plurality of parts in such a manner that a desired packet format of the traffic flow is maintained in each of the plurality of parts.

10

15

20

5

- 11. The method of claim 1 wherein the parts of the traffic flow are distributed to the respective ones of the participating nodes over pre-provisioned circuits each configured to support a corresponding one of the parts.
- 12. The method of claim 1 wherein a given one of the participating nodes routes at least a portion of its received part to a set of destination nodes determined based on destination addresses in packet headers of the portion.
- 13. The method of claim 1 wherein if the packet header of a given packet in the part of the flow received by a given one of the participating nodes indicates that the participating node is a final destination node for that packet, the packet is stored in a resequencing buffer of the participating node.
- 14. The method of claim 1 wherein if the packet header of a given packet in the part of the flow received by a given one of the participating nodes indicates that the participating node is not a final destination node for that packet, the packet is stored in a particular one of a plurality of output queues of the participating node that is associated with the final destination node for the packet.

- 15. The method of claim 1 wherein at least one of the splitting step and the distributing step is implemented at least in part in software running on a processor of a node or other element of the network.
- 16. An apparatus for use in processing a traffic flow in a communication network comprising a plurality of nodes, the apparatus comprising:

a processing device comprising a processor coupled to a memory, the processing device being operative to split the traffic flow into a plurality of parts, and to distribute the parts to respective ones of the plurality of nodes that are designated as participating in a load balancing process for the traffic flow;

wherein each of at least a subset of the participating nodes receiving one of the parts routes at least a portion of its received part to one or more destination nodes of the plurality of nodes.

- 17. The apparatus of claim 16 wherein the processing device comprises one of the participating nodes of the network.
  - 18. The apparatus of claim 16 wherein the processing device is implemented as one or more integrated circuits.
  - 19. An article of manufacture comprising a machine-readable medium storing one or more programs for use in processing a traffic flow in a communication network comprising a plurality of nodes, the one or more programs when executed in a processor implementing a method comprising the steps of:
  - distributing the parts to respective ones of the plurality of nodes that are designated as participating in a load balancing process for the traffic flow;

splitting the traffic flow into a plurality of parts; and

wherein each of at least a subset of the participating nodes receiving one of the parts routes at least a portion of its received part to one or more destination nodes of the plurality of nodes.

30

25

5

10

15

20